CHAPTER 17

Study Guide

Key Concepts

17.1 The Flow of Energy—Heat and Work

- Heat always flows from a warmer object to a cooler object.
- A system gains heat in an endothermic process, and loses heat in an exothermic process.
- Heat flow is measured with two common units, the calorie and the joule.
- The heat capacity of an object depends on both its mass and its chemical composition.

→ The specific heat is heat capacity of an object divided by mass in grams

17.2 Measuring and Expressing Enthalpy Changes

- In calorimetry, the heat released by a system equals the heat absorbed by its surroundings. Conversely, the heat absorbed by a system equals the heat released by its surroundings.
- The enthalpy change for a reaction can be treated like any other reactant or product.

17.3 Interpretation/Calculation with heating or cooling curves:

Heat in Changes of State

- The heat absorbed by a melting solid is exactly the same as the heat lost when the liquid solidifies; that is, $\Delta H_{fus} = -\Delta H_{solid}$.
- The heat absorbed by a vaporizing liquid is exactly the same as the heat lost when the vapor condenses; that is, $\Delta H_{vap} = -\Delta H_{cond}$.
- Heat is either released or absorbed during the formation of a solution.

17.4 Calculating Heats of Reaction

- You can calculate the heat of a reaction by applying Hess's law of heat summation or by using standard heats of formation.

Vocabulary

Calculations involving calorimetry and Heat use or production

- calorimeter (p. 511)
- calorimetry (p. 511)
- chemical potential energy (p. 505)
- endothermic process (p. 506)
- enthalpy (p. 511)
- exothermic process (p. 506)
- heat (p. 505)
- heat capacity (p. 508)
- heat of combustion (p. 517)
- heat of reaction (p. 514)
- Hess's law of heat summation (p. 527)
- law of conservation of energy (p. 506)
- molar heat of condensation (p. 523)
- molar heat of fusion (p. 520)
- molar heat of solidification (p. 520)
- molar heat of solution (p. 525)
- molar heat of vaporization (p. 522)
- specific heat (p. 508) C
- standard heat of formation (p. 530)
- surroundings (p. 506)
- system (p. 506)
- thermochemical equation (p. 514)
- thermochemistry (p. 505)

Key Equations

- 1 Calorie = 1 kilocalorie = 1000 calories
- $C = \frac{q}{m \times \Delta T}$ $\frac{kJ}{g\ ^\circ C}$ (specific heat units)

1 kJ = 1000 J

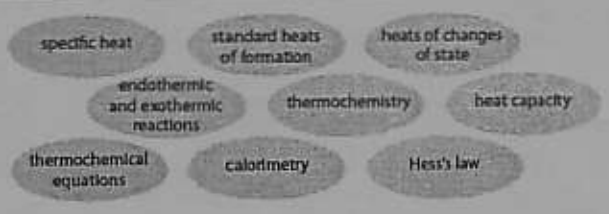
- $q_{sys} = \Delta H = -q_{surr} = -m \times C \times \Delta T$
- $\Delta H^0 = \Delta H_f^0(\text{products}) - \Delta H_f^0(\text{reactants})$

$\Delta H = nH$ $\Delta H = q$

$q = vc\Delta t$ ↑ energy per mol

Organizing Information

Use these terms to construct a concept map that organizes the major ideas of this chapter.



Interactive Textbook

Concept Map 17 Solve the Concept Map with the help of an interactive guided tutorial.

with ChemASAP

p535-539 Lots of Practise - odd #'s answers A97 (back of text)